



**BRANZ Appraised**

Appraisal No.793 [2012]

BRANZ Appraisals

Technical Assessments of products  
for building and construction

**BRANZ  
APPRAISAL  
No. 793 (2012)**

Amended 3 September 2013

**CRAFTSTONE REAL  
STONE VENEER  
SYSTEM**

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## Product

1.1 The Craftstone Real Stone Veneer System is a cavity-based external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used.

1.2 The system consists of a natural stone veneer using pre-chosen and prepared elements of natural quarried stone. The stone is bonded to fibre cement backing sheets which are fixed over timber battens to form a 20 mm cavity. The stone veneer and mortar are mechanically anchored through to the structural wall framing by stainless steel anchor ties and screws.

1.3 The system incorporates a primary and secondary means of weather resistance (first and second line of defence) against water penetration by separating the cladding from the external wall framing with a nominal 20 mm drained cavity.



## Scope

2.1 The Craftstone Real Stone Veneer System has been appraised as an external wall cladding system for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- constructed with timber framing complying with the NZBC; and,
- with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
- situated in NZS 3604 Wind Zones up to, and including, 'Extra High'.

2.2 The Craftstone Real Stone Veneer System has also been appraised for weathertightness and structural wind loading when used as an external wall cladding for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to floor area and building height; and,
- constructed with timber framing complying with the NZBC; and,
- situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 2.5 kPa.

2.3 The Craftstone Real Stone Veneer System must only be installed on vertical surfaces (except for sills which must have a minimum 10° slope and be waterproofed in accordance with the Technical Literature).

2.4 The system is appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. (*The Appraisal of the Craftstone Real Stone Veneer System relies on the joinery meeting the requirements of NZS 4211 for the relevant Wind Zone or design wind pressure.*)

2.5 Installation of components and accessories supplied by Craftstone NZ Ltd and approved installers must be carried out only by Craftstone NZ Ltd approved installers.

## Building Regulations

### New Zealand Building Code (NZBC)

**3.1** In the opinion of BRANZ, The Craftstone Real Stone Veneer System if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

**Clause B1 STRUCTURE:** Performance B1.3.1, B1.3.2 and B1.3.4. The Craftstone Real Stone Veneer System meets the requirements for loads arising from self-weight, earthquake, wind, impact and creep [i.e. B1.3.3 (a), (f),(h), (j) and (q)]. See Paragraphs 10.1 – 10.5.

**Clause B2 DURABILITY:** Performance B2.3.1 (b), 15 years, and B2.3.2. The Craftstone Real Stone Veneer System meets these requirements. See Paragraphs 11.1 and 11.2.

**Clause E2 EXTERNAL MOISTURE:** Performance E2.3.2. The Craftstone Real Stone Veneer System meets this requirement. See Paragraphs 15.1 – 15.5.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. The Craftstone Real Stone Veneer System meets this requirement and will not present a health hazard to people.

**3.2** This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance.

## Technical Specification

**4.1** System components supplied by Craftstone NZ Ltd are as follows:

### Stone

- Craftstone stone is available in the following stone types; 'Basalt Grey', 'Cape Brown', 'Coromandel Green' and 'Piha Black'. The stone elements are sorted, broken or back-cut to produce an approximate uniform thickness of 15 to 40 mm.

### Anchor Ties and Screws

- The Craftstone Craftanchor is a proprietary stainless steel tie for fixing the mortar/stone veneer layer to the timber frame. The Craftanchor is approximately 70 mm long by 20 mm wide formed from Grade 304 stainless steel. They are pre-punched with a 5 mm diameter hole for the screw. Screws are hex head 12 gauge x 65 mm long Grade 304 grade stainless steel.

### Sealer, Mortar and Mortar Tint

- Craftseal sealer is a silane/siloxane sealing agent used for sealing the face of the fibre-cement sheet. It is diluted at a ratio of 1:9 with clean water and can be applied with brush or spray pack.
- Craftbond Mortar is a proprietary pre-bagged pre-mix mortar containing selected aggregates, cement and natural mineral additives. It is supplied in 20 kg bags and is mixed on site with 4 litres of clean potable water.
- Crafttint is a dispersed liquid oxide used to colour mortar. It is available in a range of colour options.

**4.2** Accessories used with the system which are supplied by the Craftstone NZ Ltd approved installer are:

- Flashing tape for fibre cement sheet joint. A self-adhering, modified SBS (styrene-butadiene-styrene) rubberised asphalt tape.
- Flexible sealant – sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid BRANZ Appraisal for use as weather sealing sealant for exterior use.

**4.3** Accessories used with the system which are supplied by the building contractor are:

- Flexible wall underlay – building paper complying with NZBC Acceptable Solution E2/AS1 Table 23, or breather-type membranes covered by a valid BRANZ Appraisal for use as wall underlays.
- Rigid wall underlay – Plywood or fibre cement sheet complying with NZBC Acceptable Solution E2/AS1 Table 23, or rigid sheathing covered by a valid BRANZ Appraisal for use as rigid air barrier systems.
- Flexible sill and jamb tapes – flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1 Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal for use around window and door joinery openings.
- Cavity battens – nominal 50 mm wide by 20 mm thick (minimum finished size of 45 mm wide by 18 mm thick) timber treated to Hazard Class H3.1.
- Cavity batten fixings – 60 x 2.5 mm hot-dip galvanised flat head nails.
- Cavity vent strip – PVC, aluminium or stainless steel, punched with 3-5 mm holes or slots complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.3.
- Fibre cement sheet – 9.0 mm thick fibre cement sheet complying with AS/NZS 2908.2 in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.7.2.
- Joinery head flashings – as supplied by the joinery manufacturer or contractor.
- Window and door trim cavity air seal – air seals complying with NZBC Acceptable Solution E2/AS1 Paragraph 9.1.6, or self expanding, moisture cure polyurethane foam air seals covered by a valid BRANZ Appraisal for use around window, door and other wall penetration openings.

## Handling and Storage

**5.1** Handling and storage of all materials supplied by Craftstone NZ Ltd or its approved installers, whether on or off site, are under the control of Craftstone NZ Ltd approved installers. Dry storage must be provided on site for the Craftstone veneer elements. Bags of Craftbond Mortar and containers of Craftseal sealer should be stored under cover. All liquid components must be stored in frost-free conditions.

**5.2** Handling and storage of all materials supplied by the building contractor, whether on or off site, are under the control of the building contractor. Materials must be handled and stored in accordance with the relevant manufacturer's instructions.

## Technical Literature

**6.1** Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Craftstone Real Stone Veneer System. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

## Design Information

### Framing

#### Timber Treatment

**7.1** Timber wall framing behind the Craftstone Real Stone Veneer System must be treated as required by NZBC Acceptable Solution B2/AS1.

## Timber Framing

7.2 Timber framing must comply with NZS 3604 or be to a specific design in accordance with NZS 3603 and AS/NZS 1170. Where specific design is required, the framing must be of at least equivalent stiffness to the framing provisions of NZS 3604. In all cases studs must be at maximum 400 mm centres. Dwargs must be fitted flush between the studs at maximum 800 mm centres.

7.3 For specifically designed timber framed buildings situated in Wind Zones above NZS 3604 defined 'Extra High', there must be a minimum timber framing size of 90 x 45 mm, and a minimum timber grade of MSG8.

7.4 Timber framing must have a maximum moisture content of 24% at the time of the cladding application. *(If the Craftstone Real Stone Veneer System is fixed to framing with a moisture content of greater than 24% problems may occur at a later date due to excessive timber shrinkage.)*

## General

8.1 When the Craftstone Real Stone Veneer System is used for specifically designed buildings up to design differential 2.5 kPa ULS wind pressure, only the weathertightness aspects of the cladding and maximum framing and fixing centres are within the scope of this Appraisal. All other aspects of the building need to be specifically designed and are outside the scope of this Appraisal.

8.2 Punchings in the cavity vent strip must provide a minimum ventilation opening area of 1000 mm<sup>2</sup> per lineal metre of wall in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.3(b).

8.3 The ground clearance to finished floor levels as set out in NZS 3604 must be adhered to at all times. At ground level, paved surfaces, such as footpaths, must be kept clear of the bottom edge of the cladding system by a minimum of 100 mm, and unpaved surfaces by 175 mm in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Table 18.

8.4 At balcony, deck or roof/wall junctions, the bottom edge of the stone veneer must be kept clear of any adjacent surface, or above the top surface of any adjacent roof flashing by a minimum of 35 mm in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.

8.5 All external walls of buildings must have barriers to airflow in the form of interior linings with all joints stopped for wind zones up to and including 'Very High', and rigid underlays for buildings in the 'Extra High' wind zone and specifically designed buildings up to 2.5 kPa design differential ULS wind pressure. Unlined gables and walls must incorporate a rigid underlay meeting the requirements of NZBC Acceptable Solution E2/AS1, Table 23. For attached garages, wall underlays must be selected in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.4. Where rigid underlays are used, the fixing lengths must be increased by a minimum of the thickness of the underlay.

8.6 Where penetrations through the Craftstone Real Stone Veneer are wider than the cavity batten spacing, allowance must be made for airflow between adjacent cavities. A minimum 10 mm gap must be left between the bottom of the vertical cavity batten and the flashing to the opening.

8.7 Where the system abuts other cladding systems, designers must detail the junction to meet their own requirements and the performance requirements of the NZBC. The Technical Literature provides some guidance. Details not included within the Technical Literature have not been assessed and are outside the scope of this Appraisal.

## Control Joints

9.1 Control joints where the Craftstone Real Stone Veneer System is used must be constructed in accordance with the Technical Literature and be provided as follows:

- Horizontal control joints – at maximum 5.4 m centres and at inter-storey floor levels.
- Vertical control joints – at maximum 5.4 m centres; aligned with any control joint in the structural framing, or where the system abuts different cladding types.

*(Note: Horizontal and vertical control joints must be located over structural supports. The Technical Literature provides some guidance for the design of vertical control joints where the system abuts different cladding types. Details not included within the Technical Literature are outside the scope of this Appraisal and are the responsibility of the designer – see Paragraph 8.7.)*

## Inter-storey Junctions

9.2 Inter-storey drained joints must be constructed in accordance with the Technical Literature. Inter-storey joints must be provided to limit continuous cavities to the lesser of 2-storeys or 7 metres in height, in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.4(b).

## Structure

### Mass

10.1 The mass of the Craftstone Real Stone Veneer System (including the weight of the fibre cement sheet and mortar) is less than 80 kg/m<sup>2</sup> and is therefore considered a medium weight wall cladding in terms of NZS 3604.

### Impact Resistance

10.2 The system has adequate resistance to impact loads likely to be encountered in normal residential use. The likelihood of impact damage to the system when used in light commercial situations should be considered at the design stage, and appropriate protection such as the installation of bollards and barriers should be considered for vulnerable areas.

### Wind Zones

10.3 The Craftstone Real Stone Veneer System is suitable for use in all Wind Zones of NZS 3604, up to, and including 'Extra High' where buildings are within the scope as detailed in Paragraph 2.1, or up to a differential design ULS wind pressure of 2.5 kPa where buildings are specifically designed.

### Earthquake Zones

10.4 The Craftstone Real Stone Veneer System is suitable for use in all Earthquake Zones of NZS 3604 where buildings are within the scope as detailed in Paragraphs 2.1 and 2.2.

### Anchor Tie Spacing

10.5 The Craftanchor ties must be fixed at a vertical spacing of 300 mm to studs at a maximum horizontal spacing of 400 mm.

## Durability

11.1 The Craftstone Real Stone Veneer System meets the performance requirements of NZBC Clause B2.3.1 (b), 15 years for the stone veneer cladding system.

### Serviceable Life

11.2 The Craftstone Real Stone Veneer System is expected to have a serviceable life of at least 35 years provided the system is maintained in accordance with this Appraisal.

## Maintenance

12.1 Regular maintenance is essential to ensure the performance requirements of the NZBC are continually met, and to ensure the maximum serviceability of the system.

12.2 Regular cleaning (at least annually) is required to remove grime, dirt and organic growth and to maximise the life and appearance of the stone. Grime may be removed by brushing with a soft bristle brush, warm water and detergent.

12.3 Annual inspections must be made to ensure that all aspects of the Craftstone Real Stone Veneer Cladding System, including flashings and any sealed joints remain in a weatherproof condition. Any cracks, damaged areas, or areas showing signs of deterioration which could allow water ingress, must be repaired immediately. The Craftstone Real Stone Veneer System must be repaired in accordance with the instructions of Craftstone NZ Ltd.

12.4 Minimum ground clearances as set out in this Appraisal and the Technical Literature must be maintained at all times during the life of the system. *(Failure to adhere to the minimum ground clearances given in this Appraisal and the Technical Literature will adversely affect the long term durability of the Craftstone Real Stone Veneer as a cladding system.)*

## Control of External Fire Spread

13.1 The Craftstone Real Stone Veneer System is suitable for use on buildings with an SH Risk Group classification, a building height of  $\leq 10$  m and at a distance of  $\geq 1.0$  m to the relevant boundary. Refer to NZBC Acceptable Solutions C/AS2 – C/AS6 Paragraph 5.8.1 for the specific exterior surface finishes requirements for other building Risk Groups.

*(Note: The scope of this Appraisal limits building heights to 10 m in accordance with the limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1(a). The building heights referenced in Paragraph 12.1 above are as defined in the Definitions Sections of NZBC Clauses C1 - C6 Protection from Fire.)*

## Prevention of Fire Occurring

14.1 Separation or protection must be provided to Craftstone Real Stone Veneer System from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

## External Moisture

15.1 The Craftstone Real Stone Veneer System, when installed in accordance with this Appraisal and the Technical Literature, prevents the penetration of moisture that could cause undue dampness or damage to building elements.

15.2 The cavity must be sealed off from the roof and sub-floor space to meet the performance requirements of NZBC Clause E2.3.5.

15.3 The Craftstone Real Stone Veneer System allows excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet the performance requirements of NZBC Clause E2.3.6.

15.4 The details given in the Technical Literature for weather sealing are based on the design principle of having a first and second line of defence against moisture entry for all joints, penetrations and junctions. The ingress of moisture must be excluded by detailing joinery and wall interfaces as shown in the Technical Literature. Weathertightness details that are developed by the designer are outside the scope of this Appraisal and are the responsibility of the designer for compliance with the NZBC.

15.5 The use of the Craftstone Real Stone Veneer System where there is a designed cavity drainage path for moisture that penetrates the cladding does not reduce the requirement for junctions, penetrations, etc to remain weather resistant.

## Internal Moisture

16.1 Buildings must be constructed with an adequate combination of thermal resistance and ventilation, and space temperature must be provided to all habitable spaces, bathrooms, laundries and other spaces where moisture may be generated or may accumulate.

### Water Vapour

16.2 The Craftstone Real Stone Veneer System is not a barrier to the passage of water vapour, and when correctly installed will not create or increase the risk of moisture damage resulting from condensation.

## Installation Information

### Installation Skill Level Requirements

17.1 Installation and finishing of the components of the Craftstone Real Stone Veneer System supplied by Craftstone NZ Ltd and its approved installers must be completed only by the Craftstone NZ Ltd approved installers.

17.2 Installation of the components and accessories supplied by the building contractor must be completed by tradespersons with an understanding of cavity construction, in accordance with instructions given within the Craftstone Real Stone Veneer System Technical Literature and this Appraisal.

## System Installation

### Underlay and Flexible Sill and Jamb Tape Installation

18.1 The selected building underlay and flexible sill and jamb tape system must be installed by the building contractor in accordance with the underlay and tape manufacturer's instructions prior to the installation of the cavity battens and the rest of the Craftstone Real Stone Veneer System. Flexible underlay must be installed horizontally and be continuous around corners. Underlay must be lapped 75 mm minimum at horizontal joints and 150 mm minimum over studs at vertical joints. Generic rigid underlay materials must be installed in accordance with NZBC Acceptable Solution E2/AS1 and be overlaid with a flexible wall underlay. Proprietary systems shall be installed in accordance with the manufacturer's instructions. Particular attention must be paid to the installation of the underlay and sill and jamb tapes around window and door openings, to ensure a continuous seal is achieved and all exposed wall framing in the opening is protected.

### Aluminium Joinery Installation

18.2 Aluminium joinery must be installed by the building contractor in accordance with the Technical Literature. A 7.5 – 10 mm nominal gap must be left between the joinery reveal and the wall framing so a PEF rod and air seal can be installed after the joinery has been secured in place.

### Craftstone Real Stone Veneer System

18.3 The system must be installed in accordance with the Technical Literature by Craftstone NZ Ltd approved installers.

18.4 The Craftstone Real Stone Veneer System must only be applied when the air and substrate temperature is within the range of +5°C to +30°C.

## Finishing

18.5 Craftstone NZ Ltd installation instructions must be followed at all times for finishing of mortar work. Excess mortar must be removed carefully with a soft brush when the mortar is partially dry (after approximately 1 hour). The quality of the final pointing and mortar work is pivotal to the final aesthetic look of the stone veneer.

## Inspections

18.6 The Technical Literature must be referred to during the inspection of Craftstone Real Stone Veneer System installations.

## Health and Safety

19.1 Cutting of Craftstone stone must be carried out in well ventilated areas, and a dust mask and eye protection must be worn.

19.2 When power tools are used for cutting, grinding or forming holes, health and safety measures must be observed because of the amount of dust generated.

19.3 Safe use and handling procedures for the components that make up the Craftstone Real Stone Veneer System are provided in the relevant manufacturer's Technical Literature.

## Basis of Appraisal

The following is a summary of the technical investigations carried out:

## Tests

20.1 The following testing and assessments have been undertaken by BRANZ:

- BRANZ expert opinion on NZBC E2 code compliance for the Craftstone Real Stone Veneer System was based on evaluation of all details within the scope and as stated within this Appraisal and testing of the Craftstone Real Stone Veneer System to E2/VM1. The testing assessed the performance of the foundation detail, window head, jamb and sill details, meter box head, jamb and sill details, vertical and horizontal control joints, internal and external corners, and pipe penetration. In addition to the weathertightness test, the details contained within the Technical Literature have been reviewed, and an opinion has been given by BRANZ technical experts that the system will meet the performance levels of Acceptable Solution E2/AS1 for drained cavity claddings.
- Face load bend tests of the stone/mortar element of the system and fastener pull-out testing for the Craftanchor determined design wind suction pressures, and by comparing these pressures with the NZS 3604 design wind speeds and AS/NZS 1170 pressure coefficients, the fixing requirements were determined for use with timber framed walls.
- In-plane shear testing of the Craftstone Real Stone Veneer System was carried out to determine the system's ability to resist self-weight.
- Assessment and engineering calculation of the performance of the Craftstone Real Stone Veneer System to both serviceability level and ultimate level seismic deflections was completed to determine the system's ability to resist seismic loads.

## Other Investigations

21.1 Structural and durability opinions have been provided by BRANZ technical experts.

21.2 Site visits of Craftstone Real Stone Veneer System installations have been carried out by BRANZ to assess the practicability of installation and to examine completed installations.

21.3 The Technical Literature for the Craftstone Real Stone Veneer System has been examined by BRANZ and found to be satisfactory.

## Quality

22.1 The manufacture of the natural veneer stone elements has not been examined by BRANZ, however methods adopted for quality control, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

22.2 The quality of materials, components and accessories supplied by Craftstone NZ Ltd is the responsibility of Craftstone NZ Ltd

22.3 Quality on-site is the responsibility of Craftstone NZ Ltd approved installers.

22.4 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of framing systems and joinery, building underlays, flashing tapes, air seals, cavity battens and fibre cement sheets in accordance with the instructions of Craftstone NZ Ltd.

22.5 Building owners are responsible for the maintenance of the Craftstone Real Stone Veneer System installations in accordance with the instructions of Craftstone NZ Ltd.

## Sources of Information

- AS/NZS 1170: 2002 Structural design actions.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3603: 1993 Timber Structures Standard.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4211: 2008 Specification for performance of windows.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005 (Amendment 5, 1 August 2011).
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.



**BRANZ**

In the opinion of BRANZ, **Craftstone Real Stone Veneer System** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Craftstone NZ Ltd**, and is valid until further notice, subject to the Conditions of Appraisal.

#### Conditions of Appraisal

1. This Appraisal:
  - a) relates only to the product as described herein;
  - b) must be read, considered and used in full together with the technical literature;
  - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
  - d) is copyright of BRANZ.
2. **Craftstone NZ Ltd**:
  - a) continues to have the product reviewed by BRANZ;
  - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
  - c) abides by the BRANZ Appraisals Services Terms and Conditions.
  - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
  - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
  - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
  - c) any guarantee or warranty offered by **Craftstone NZ Ltd**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Craftstone NZ Ltd** or any third party.

For BRANZ

P Burghout  
Chief Executive

Date of issue: 4 September 2012

#### Amendment No. 1, dated 3 September 2013.

This Appraisal has been amended to update clause changes as required by the introduction of NZBC Fire Clauses C1 – C6 Protection from Fire and A3 Building Importance Levels.